

DRAFT Essential Elements: Mathematics Grade 3

ESSENTIAL ELEMENTS: MATHEMATICS GRADE 3						
Michigan K-12 Standards for Mathematics	Essential Element*	Claim	Michigan Range of Complexity			Level assessed
			High Complexity Level	Medium Complexity Level	Low Complexity Level	
Third Grade Mathematics Domain: Operations and Algebraic Thinking						
CLUSTER: Represent and solve problems involving multiplication and division						
3.OA.1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5×7 .	EE.3.OA.1-2. Use repeated addition to find the total number of objects and determine the sum.	4	EE.3.OA.H.1-2 The student can use repeated addition to find a sum.	EE.3.OA.M.1-2 The student can add equal groups of objects to find the total sum of objects.	EE.OA.3.L.1-2 The student can distinguish between more and less (fewer).	Classroom/State
3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.						
3.OA.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	Not applicable See EE.3.OA.1 and EE.5.NBT.5.		NA	NA	NA	NA
3.OA.4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = _ \div 3$, $6 \times 6 = ?$	EE.3.OA.4. Solve addition and subtraction problems when result is unknown, limited to operands and results within 20.	1	EE.3.OA.H.4 The student can solve addition and subtraction problems when the result is unknown (within 20).	EE.3.OA.M.4 the student can solve addition and subtraction problems when the result is unknown (within 10).	EE.3.OA.L.4 the student can recognize numbers 1-9.	Classroom/State
3.OA.5. Apply properties of operations as strategies to multiply and divide.9 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)	Not applicable. See EE.N-CN.2.		NA	NA	NA	NA
3.OA.6. Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.	Not applicable. See EE.5.NBT.6–7.		NA	NA	NA	NA
CLUSTER: Multiply and Divide within 100						
3.OA.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	Not applicable. See EE.7.NS.2.a and EE.7.NS.2.b.		NA	NA	NA	NA
CLUSTER: Solve problems involving the four operations, and identify and explain patterns in arithmetic						
3.OA.8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	EE.3.OA.8. Solve one-step real-world problems using addition or subtraction within 20.	4	EE.3.OA.H.8 The student can solve one-step real-world problems using addition or subtraction with sums/differences within 20.	EE.3.OA.M.8 The student can solve one-step real-world problems using addition or subtraction with sums/differences within 10.	EE.3.OA.L.8 The student can use counting (up to 5) to solve real-world problems.	Classroom/State
3.OA.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.	EE.3.OA.9. Identify arithmetic patterns.	4	EE.3.OA.H.9 The student can create, describe, and extend simple number patterns.	EE.3.OA.M.9 The student can create, describe, and/or extend simple number patterns or patterns involving objects or symbols.	EE.3.OA.L.9 The student can recognize same or different in a simple pattern involving objects or symbols.	Classroom/State
Third Grade Mathematics Domain: Number and Operations in Base 10						
CLUSTER: Use place value understanding and properties of operations to perform multi-digit arithmetic						

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3.NBT.1. Use place value understanding to round whole numbers to the nearest 10 or 100.	EE.3.NBT.1. Use decade numbers (10, 20, 30) as benchmarks to demonstrate understanding of place value for numbers 0–30.					Classroom
3.NBT.2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	EE.3.NBT.2. Demonstrate understanding of place value to tens.	1	EE.3.NBT.H.2 The student can compose and decompose numbers to 30 using models of tens and ones.	EE.3.NBT.M.2 The student can compose a number using models of tens.	EE.3.NBT.L.2 The student can differentiate between more and less when given two sets of objects with extreme differences.	Classroom/State
3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.	EE.3.NBT.3. Count by tens using models such as objects, base ten blocks, or money.	1	EE.3.NBT.H.3 The student can count by tens to 100 using base ten blocks or money.	EE.3.NBT.M.3 The student can count to 30, showing one-to-one correspondence.	EE.3.NBT.L.3 The student can rote count to 10.	Classroom/State
Third Grade Mathematics Domain: Number and Operations -Fractions						
CLUSTER: Use place value understanding and properties of operations to perform multi-digit arithmetic						
3.NF.1. Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	EE.3.NF.1–3. Differentiate a fractional part from a whole.	1	EE.3.NF.H.1-3 The student can identify a unit fraction or use a model to represent a unit fraction (limited to one half and one fourth).	EE.3.NF.M.1-3 The student can identify the difference between a whole object and one half of an object.	EE.3.NF.L.1-3 The student can differentiate between a whole object and some of an object.	Classroom/State
3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.						
3.NF.2.a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.						
3.NF.2.b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.						
3.NF.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.						
3.NF.3.a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.						
3.NF.3.b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.						
3.NF.3.c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.						
3.NF.3.d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.						
Third Grade Mathematics Domain: Measurement and Data						
CLUSTER: Solve Problems involving measurement and estimation of intervals of time, liquid volumes and masses of objects						
3.MD.1. Tell and write time to the nearest minute, and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	EE.3.MD.1. Tell time to the hour on a digital clock	3	EE.3.MD.H.1 The student can tell time to the hour on a digital clock.	EE.3.MD.M.1 The student can identify the hour on a digital clock.	EE.3.MD.L.1 The student can recognize that a clock is used to measure time.	Classroom/State
3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).13 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	EE.3.MD.2. Identify the appropriate measurement tool to solve one-step word problems involving mass and volume.	3	EE.3.MD.H.2 The student can identify the standard units of measure for mass (limited to pounds) and liquid volume (limited to cups).	EE.3.MD.M.2 The student can identify the standard tools to measure a solid (scale) and liquid (cup/s).	EE.3.MD.L.2 The student can differentiate between a solid and a liquid.	Classroom/State
CLUSTER: Represent and interpret data						

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3.MD.3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.	EE.3.MD.3. Use picture or bar graph data to answer questions about data.	3	EE.3.MD.H.3 The student can use a bar graph or a picture to answer questions about data.	EE.3.MD.M.3 The student can recognize that a bar graph and a circle graph are tools to display data.	EE.3.MD.L.3 The student can classify an object based on a shared attribute with another object (eating utensils, foods, pets, vehicles, cold weather clothing).	Classroom/State
3.MD.4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	EE.3.MD.4. Measure length of objects using standard tools, such as rulers, yardsticks, and meter sticks.	3	EE.3.MD.H.4 The student can use a ruler drawn as part of a graphic to measure length to the nearest whole unit.	EE.3.MD.M.4 The student can measure the length of an object using informal (non-standard) units (e.g., an object is the same length as three paper clips).	EE.3.MD.L.4 The student can compare two objects with extreme differences in length to determine the longer or shorter length .	Classroom/State
CLUSTER: Geometric measurement: understand concepts of area, and relate area to multiplication and to addition.						
3.MD.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.	Not applicable. See EE.4.MD.2 .		NA	NA	NA	NA
3.MD.5.a. A square with side length of 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.						
3.MD.5.b. A plane figure, which can be covered without gaps or overlaps by n unit squares, is said to have an area of n square units.						
3.MD.6. Measure areas by counting unit squares (square cm, square m, square in., square ft, and improvised units).						
3.MD.7. Relate area to the operations of multiplication and addition.						
3.MD.7.a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.						
3.MD.7.b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.						
3.MD.7.c. Use tiling to show in a concrete case that the area of a rectangle with wholenumber side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.						
3.MD.7.d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems.						
CLUSTER: Geometric measurement: recognize perimeter as an attribute of plane figures, and distinguish between linear and area measures.						
3.MD.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	Not applicable. See EE.7.G.4 and EE.8.G.9 .		NA	NA	NA	NA
Third Grade Mathematics Domain: Geometry						
CLUSTER: Reason with shapes and their attributes						
3.G.1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	EE.3.G.1. Describe attributes of two-dimensional shapes.	2	EE.3.G.H.1 The student can use the number of sides to describe or identify a two-dimensional shape.	EE.3.G.M.1 The student can recognize sides or angles in two-dimensional shapes.	EE.3.G.L.1 The student can identify a circle, a square, and a triangle.	Classroom/State
3.G.2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.	EE.3.G.2. Recognize that shapes can be partitioned into equal areas.	2	EE.3.G.H.2 The student can partition a shape into halves, thirds, and fourths.	EE.3.G.M.2 The student can recognize that a circle and a rectangle can be partitioned into equal areas, limited to halves and fourths.	EE.3.G.L.2 The student can recognize one half of a shape.	Classroom/State
Claim 1: Students demonstrate increasingly complex understanding of number sense. Claim 2: Students demonstrate increasingly complex spatial reasoning and understanding of geometric principles.						
Claim 3: Students demonstrate increasingly complex understanding of measurement, data and analytic procedures. Claim 4: Students solve increasingly complex mathematical problems, making productive use of algebra and functions.						

*Dynamic Learning Maps Consortium (2013). Dynamic Learning Maps Essential Elements for Mathematics. Lawrence, KS: University of Kansas.